were classified to non-HR-related (Type 1, ΔHR < 5bpm) and HR-related (Type 2, ΔHR > = 10bpm) episodes. Frequency domain heart rate variability proceeding 30 min before ischemic ST depression was measured. After control study, isosorbide dinitrate was given orally to 19 pts, diltiazem or nifedipine to 18 pts, and propranolol or metprolol to 19 pts. *Results:* At control study, 34 Type 1 and 233 Type 2 episodes were detected. Type 1 episodes were preceeded by higher LF/HF and lower HF than Type 2. Ca-antagonists were more effective in suppressing Type 1 than Type 2 episodes (64% vs 35% reduction). On the other hand, beta-blockers caused a marked reduction of both Type 1 and Type 2 episodes (67% vs 70%).

Conclusion: Because an enhancement of sympathetic activity plays an important role for the genesis of ambulatory myocardial ischemia, inhibition of sympathetic activity may be greatly attributed to anti-ischemic effect of beta-blocker to Type 1 as well as to Type 2 episodes.

1036-80 Time-Frequency Distribution Study of Lower Frequency Spectra of Heart Rate Variability in Severe Congestive Heart Failure-Low Dose Beta-Blocker Effect

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Severe congestive heart failure (CHF) could lead to marked physiological perturbation and macro-organization of the cardiopulmonary dynamics, behaving as long-wavelength oscillation (0.02 Hz) and won't be appreciated by routine heart rate variability (HRV) study focusing at the high (0.15–0.4 Hz) and low (0.05–0.15 Hz) frequency spectra. To investigate the stereotypic control of autonomic nervous system in severe CHF, we employed the smoothed pseudo Wigner-Ville distribution (SPWVD) analysis of the lower frequency (< 0.05 Hz) dynamics in 24-hour HRV in 13 patients (pts) before and after 3-month low-dose beta-blocker (BB) therapy (atenolol, 6.25–25 mg, qd). All 13 pts had clinical improvement of functional class for 1–2 orders, and increase of left ventricle (LV) ejection fraction (EF) (21 ± 2% vs 37 ± 6%, P < 0.05), decrease of LV end systolic dimension (LVESD)(52 ± 2 mm vs 40 ± 2 mm, P < 0.05) by echocardiography. Before BB, SPWVD of 9 of 13 pts had clear long-wavelength Cheyne-Stokes oscillation (CSO) concentrating at frequencies between 0.009 and 0.014 Hz. After BB, all the CSO phenomena either disappeared or markedly reduced in amplitude. Quantitatively, the fractal power of the frequency band between 0.025 and 0.05 Hz, but not less or more, could be increased significantly after clinical improvement by BB (6.9 ± 1.1, vs 5.8 ± 1.6 before BB). The same range of lower frequency power (absolute and normalized) was linearly correlated to the LV function parameters.(vs LVEF, r = 0.52, P ≤ 0.013); vs LVESD, r = −0.49, P ≤ 0.022). Conclusion, the time-frequency dynamic distribution study of the lower frequency spectra (< 0.05 Hz) of HRV is accurate and delicate in uncovering the macroorganization of the complex physiologic and autonomic system in severe CHF.

1036-81 Long Term Stability of Ventricular Rhythm During Paroxysmal Atrial Fibrillation: Digoxin vs Placebo

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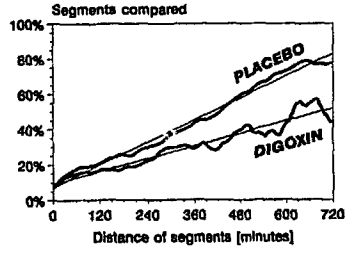
The effects of Digoxin on ventricular response during atrial fibrillation (AF) and consequent effects on arrhythmic symptoms have still not been fully explained. This study investigated whether the treatment by Digoxin contributes to mid- and long-term stabilisation of ventricular cycles in patients with paroxysmal AF.

A population of 23 patients with paroxysmal AF underwent two 24-hour electrocardiography during both phases of a randomised cross-over comparison of Digoxin and Placebo. This yielded 32 Holter recordings which contained AF episodes of at least 2 min. Each AF episode was divided into non-overlapping segments of 32 sec and the statistical distribution of RR intervals in each segment was compared with the distribution of all other AF segments in the same recording using the Kolmogorov-Smirnov test. The numbers of tests which did and did not reveal significant differences were sorted according to the distance of the segments compared and pooled for all tapes on Placebo (n = 18) and on Digoxin (n = 14).

The graph shows the percentages of AF segments with RR interval distributions different at the level of $\alpha = 0.05$. Both on Placebo and on Digoxin, the adjacent AF segments (distance 0) differed significantly only in < 10%. However, with increasing the distance of segments, the proportion of significant differences between RR interval distributions increased more with Placebo than with Digoxin ($p < 10^{-9}$, χ^2 test).



Conclusion: In patients with PAF, Digoxin leads to more regular and more reproducible patterns of ventricular cycles which are likely to be clinically better tolerated.

1036-82 Variability of Ventricular Premature Complexes (VPCs) and Sudden Death Risk

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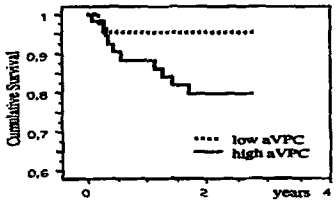
We propose a new non-invasive method for the assessment of SCD risk, the analysis of RR intervals related to VPCs in a Holter ECG. 107 patients suffering from coronary heart disease and ≥ 5 VPCs/h were followed over a median of 1.5 years. End points were total mortality and sudden cardiac death mortality.

In each patient, a 24-h Holter ECG was recorded. All QRS complexes were identified by means of the Oxford Excel Holter system, which allows a visual check on a beat-to-beat basis. The variability of VPCs was quantified by a method of nonlinear dynamics, the local density gradient, α. The frequency distribution histogram of these gradients, $n(\alpha)$, was computed, and the location of the VPC peak, αVPC, was taken as the risk indicator. The predictive value of αVPC was compared to that of 12 heart rate variability parameters by multivariate Cox regression analysis. The survival rates were assessed by the Kaplan-Meier method. During follow-up, 28 out of 107 patients died, 16 of them suddenly. αVPC was a potent predictor of SCD and total mortality and was superior to conventional heart rate variability methods tested ($p < 0.01$).



Conclusion: In CHD patients, a complexity analysis of RR intervals related to VPCs can identify a subgroup with an increased risk for sudden cardiac death.

1036-83 Circadian Pattern of 3,087 Patients With Supraventricular Tachycardias

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There have been no previous reports of large multi-center studies of circadian patterns in the occurrence of supraventricular tachycardias (SVT). We have analyzed transtelephonic cardiac detection records covering a 26 month period. The computerized database (Cardiac Datacorp-CardioCare) contained 4,169 documented episodes of sustained SVT (greater than 30 seconds) at a heart rate above 150 beats/minute (bpm) in 3,087 patients. The SVT population was 61% female and 39% male, with an average age of 43.6 years. The first reported symptom in 81% of the cases was rapid or irregular heart beat. SVT reports were categorized by the hour of the day in which they occurred and divided by heart rate into three groups: low rate, 150–199; intermediate rate, 200–249; and high rate, 250–300 bpm. The low rate category comprised 2,744 (65.8%) of the calls, the intermediate rate, 1,165 (27.9%) and the high rate 260 (6.2%). Results: (1) SVT activity was high from 8 am to 10 pm and low from 12 am to 8 am. (2) Low rate SVT peaks at 9 am, intermediate rate SVT reaches an early afternoon maximum, while high rate SVT was most probable between 3 pm and 5 pm. Conclusions: SVT occurs throughout the day and evening but is suppressed nearly to zero during sleep. Circadian variations in SVT occurrence are linked to tachycardia heart rate.